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BIOECOLOGICAL PARAMETERS OF THE OLIVE BEETLE PHLOEOTRIBUS SCARABAEOIDES BERN (COLEOPTERA, SCOLYTIDAE) IN AN OLIVE GROVE IN KABYLIE (TIZI-OUZOU, ALGERIA)

KARIM MIMOUN[1] & SALAHEDDINE DOUMANDJI[2]

[1]Department of Agricultural Sciences, University of M'Sila, Algeria

[2]Laboratory Research in Plant Protection, National High School of Agronomy El Harrach, Algeria

ABSTRACT

The study of the biology of' olive beetle *Phloeotribus scarabaeoides* is conducted in a region of Kabylia in an olive grove variety "Chemlel". The study of the biology of this species is based on tracking nutrition galleries for 12 months. The results show that this species is active throughout the year and attacks healthy *Olea europaea* causing breakage of branches. The activity of adult nutrition shows four distinct phases corresponding to 4 generations per year. The cycle has two periods of rest, hibernation and aestivation. The insect attacks the branches of small diameter with a preference for those of 2 to 4 mm. For the distribution of olive beetles' attacks in the tree it is dependent on the prevailing wind direction.

KEYWORDS: *Phloeotribus scarabaeoides*, Nutrition Galleries, Life Cycle, Beetle, Olive Tree

INTRODUCTION

The Olea europea is adapted to the temperate and warm climates characterizing the Mediterranean basin. Although rustic, it is not exempted from biotic environmental factors. In the Mediterranean area about ten pests attend olive tree (Loussert and Brousse, 1978). Beetles are among insects of great economic importance because of the damage they induce on fruit trees and forest trees. For Balachowsky (1963), the vast majority of beetles are insects living at the expense of woody plants. The "olive beetle" *Phloeotribus scarabaeoides* is a specific pest of *Olea europea* (Civantos Lopez-Villalta, 1999). This species is also well studied in Morocco and Tunisia (Benazoun, 1997). In Algeria, no studies on the biology of olive beetle have been performed. This study is a first approach to the biology of this species in Great Kabylia.

MATERIALS AND METHODS

Study Site

The study is conducted in an olive grove in the Tagmount station at Ouaguenoun region (36° 46 '12" N, 4° 10' 29" E). It is characterized by a Mediterranean climate with cool, wet winter and hot and dry summer.

METHODOLOGY

The cycle study of *Phloeotribus scarabaeoides* is based on monitoring attacks on the tree through the analysis of the branches. Sampling is carried out on harvested branches up. Each output, four trees are considered random. Thus, trees visited evidently differ from one output to another. On each tree, branches of 30 cm long, two per cardinal direction and two in the center are taken.

Samples are regularly made in the station around the 15th of each month, from June 2011 until May 2012. Harvested wood is stripped of its leaves to avoid rapid drying out. The shoots are examined through a binocular microscope to image not reversed to note the number of existing galleries on each branch. Then the branches are gathered by direction placed under ambient conditions until the imaginal emergence. Once completed emergences, branches are dissected under a binocular lens to recognize the shape, length and diameter of each gallery.

RESULTS AND DISCUSSIONS

Branches Diameters Requested by *Phloeotribus scarabaeoides*

Of the 480 branches examined, the observed galleries are the number of 236.These branches are observed with diameters ranging between 1 and 7 mm. However, their number is variable depending on the classes of diameters. The number of galleries for each diameter class is shown in the following figure.

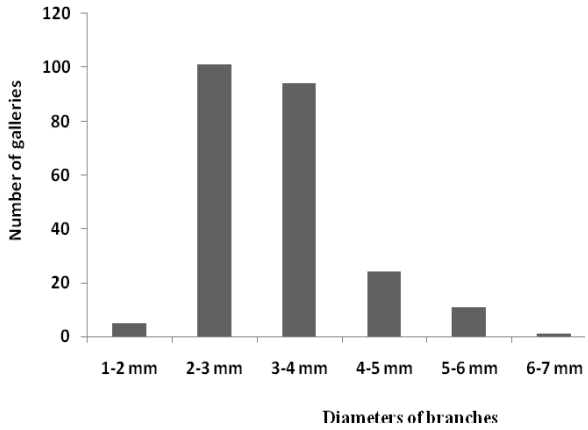

Figure 1: Number of Galleries Dug for Each Class of Branch Diameters

It appears that the small twigs diameters between 2 and 3 mm are the most selected by adults of *Phloeotribus scarabaeoides* (42.79%).Those whose diameters are between 3 and 4 mm correspond to a high frequency (39.83%). For diameter classes against the 1- 2 mm and 6 -7 mm are less desirable. In a species of wood-boring, *Xylomedes coronata* (Bostrychidae) near Bejaia (36 ° 45 'N, 5 ° 05' E.), Aberlenc and Hamlaoui (2011) reported the preference of this species for the branches of *Olea europaea* of small diameter (0.6 to 1 cm). It seems that boring looking tender shoots are rich in sap.

Evolution of the Number of Galleries

Galleries drilled by olive beetle on twigs are simple longitudinal design without nick laying. It is in fact nutrition galleries. Balachowsky (1963) notes that bite nutrition for many beetles are essential for the maturation of the genitals before spawning. Females of *Phloeotribus scarabaeoides* are sexually immature in their natal emergence of loges (Benazoun and Oubrou, 1997). Maturation galleries performed by *Hylurgus ligniperda* on pine are parallel to the axis of its support, more or less sinuous containing no nick laying and with caliber slightly higher than its size (Fabre and Carle, 1975). Actual galleries constructed by olive beetle fluctuate from one month to another (Figure 2).

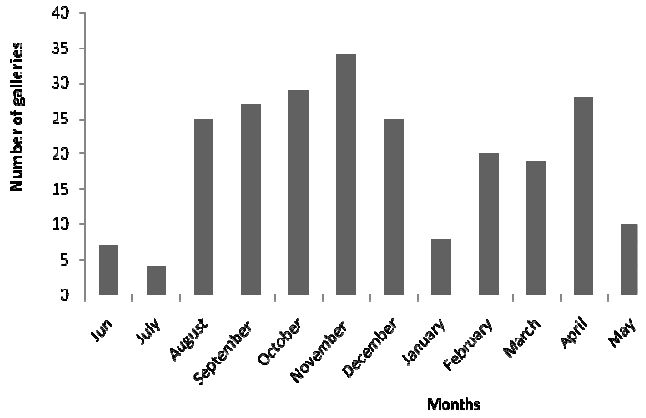

Figure 2: Fluctuations in Numbers of Galleries in Function of Months on Olive Tree Near Ouaguenoun in 2011/2012

It is recalled that the maturation galleries are produced in healthy and vigorous trees. Affected branches break under wind action and therefore eventually dry. According to Sauvard et *al*. (1987), another species of Scolytidae, the pine shoot beetle (*Tomicus piniperda* L.) are generally reproduced on dying trees. But even in healthy populations, the infection induces loss of significant growth.

At Ouaguenoun, while in June-July the number of galleries counted is low in august it rises sharply and remained at a high level until November. During this period, it appears that two generations appear with some overlap. It is worthy that the number of galleries betraying the imaginal activity falls in January. Over the next month, February resumed activity and continues until April. Mid-spring is a new peak. From these observations, it appears that the life cycle of the olive beetle presents periods of intense activity and periods of relative rest. The present results confirm those of Benazoun and Oubrou (1995) who note four generations of *Phloeotribus scarabaeoides* on olive tree in the region of Taroudant (Morocco).

Distribution of Galleries on Tree

The distribution of *Phloeotribus scarabaeoides* infestations on *Olea europaea* based on the center and the cardinal directions is reported in figure 3.

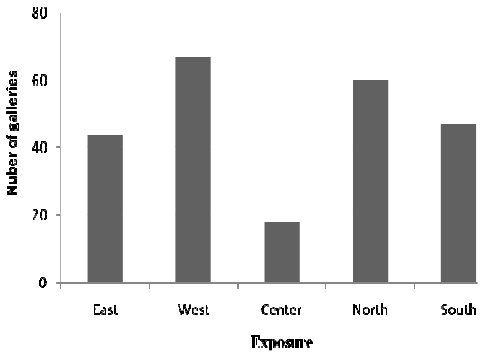

Figure 3: Number of Galleries Dug in Twigs by ''Olive Beetle'' Compared the Center and the Four Cardinal Directions

The test of Kurskal-Wallis (H = 13.15, P <0.05) showed a significant difference between the center and different

directions. Perforation tunnels in branches in western exposure are the most numerous, with an average of 0.70 ± 0.12 galleries per branch. The importance of infestations can be explained in relation to the prevailing winds. Indeed, the most frequent winds that blows in the region from the west in winter and west-northwest in the summer. This observation confirms that of Civantos Lopez-Villalta (1999) who reported that *Phloeotribus scarabaeoides* colonizes groves situated facing the prevailing winds. It should be noted that at Ouaguenoun, the northern exposure of the olive appears sought by the predator (mean = 0.62 ± 0.12 galleries per branch). Instead, southern (0.49 ± 0.12 galleries per branch) and eastern parts (0.45 ± 0.09 galleries per branch) of the leaf crown of the tree are not requested by the olive beetle. However, the center of the tree is the least infested by bark beetles. It should be noted that within the leaf crown it is cooler during the day, more humid and less clear. It appears that these factors, as well as the foliage itself reduce the displacement of the insect to attain central branches.

On almond grove in Morocco, Benazoun (2004) notes that the beetle *Ruguloscolytus amygdali* G. attacks almond tree regardless of orientation. However, in a pistachio orchard in Tlemcen (Algeria), Chebouti et *al*. (2011) note the greater frequency of *Chaetoptelius vestitus* infestations for the southern exposure of the tree.

CONCLUSIONS

Monitoring cycle of *Phloeotribus scarabaeoides* during the year 2011/2012 at Ouaguenoun highlights the continuous activity of the insect.

Maturation attacks before spawning are on twigs of healthy and vigorous trees of diameter 2 to 4 mm. Then the spawn appears on cutting wood and decaying wood. The abandonment of cutting wood in plots by farmers, sometimes dry conditions of the Mediterranean climate and the lack of maintenance of olive groves are behind the proliferation of the species

The fight against this pest is primarily preventive maintaining trees in better conditions for development. It is imperative to burn the prunings. It is of interest to identify natural enemies to control pest populations.

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